Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of:	)	
Closed Captioning of Internet Protocol-Delivered Video Programming: Implementation of the Twenty-First Century Communications and Video Accessibility Act of 2010	)	MB Docket No. 11-154

Reply Comments to the Oppositions of the Mitsubishi Electric Visual Solutions America and the Consumer Electronics Association to the Petition for Reconsideration Regarding Apparatus Synchronization by

Telecommunications for the Deaf and Hard of Hearing, Inc. (TDI)
National Association of the Deaf (NAD)
Deaf and Hard of Hearing Consumer Advocacy Network (DHHCAN)
Association of Late-Deafened Adults (ALDA)
Hearing Loss Association of America (HLAA)
Cerebral Palsy and Deaf Organization (CPADO)
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DISCUSSION

Telecommunications for the Deaf and Hard of Hearing, Inc. (TDI), the National Association of the Deaf (NAD), the Deaf and Hard of Hearing Consumer Advocacy Network (DHHCAN), the Association of Late-Deafened Adults (ALDA), the Hearing Loss Association of America (HLAA), the Cerebral Palsy and Deaf Organization (CPADO), collectively, "Consumer Groups," and the Technology Access Program at Gallaudet University (TAP), pursuant to rule 1.429, respectfully submit these reply comments to the oppositions of Mitsubishi Electric Visual Solutions America ("MEVSA") and the Consumer Electronics Association ("CEA") to the petition for reconsideration of the Commission's *Report and Order* in the above captioned proceeding by the Consumer Groups.[1]

CEA and MEVSA each oppose the Consumer Groups' petition for reconsideration of the Commission's decision not to impose synchronization requirements on apparatus manufacturers. In support of their oppositions, CEA and MEVSA each make the same two substantive arguments:

1. That caption decoders in apparatuses cannot cause synchronization problems;[2] and
2. That a synchronization requirement would be impossible to support based on current standards.[3]

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[1] *Closed Captioning of Internet Protocol-Delivered Video Programming: Implementation of the Twenty-First Century Communications and Video Accessibility Act of 2010*, *Report and Order*, MB Docket. No. 11-154, 27 FCC Rcd. 787 (Jan. 13, 2012) ("*Report and Order*"); *Consumer Groups Petition for Reconsideration*, MB Docket No. 11-154 (Apr. 27, 2012) ("*Consumer Groups Petition*"); *Comments of MEVSA*, MB Docket No. 11-154 (June 7, 2012) ("*MEVSA Opposition*"); *CEA Opposition to Petitions for Reconsideration*, MB Docket No. 11-154 (June 7, 2012) ("*CEA Opposition*").

[2] *MEVSA Opposition* at 2-3; *CEA Opposition* at 18-19

[3] *MEVSA Opposition* at 3-4; *CEA Opposition* at 19-20

Contrary to MEVSA's and CEA's arguments, apparatuses must be specifically designed to play back video and captions according to the precise timing imparted by a video's author when captions are initially encoded. Moreover, this synchronization is possible under all mainstream captioning standards, including CEA-608, CEA-708, and the Commission's safe harbor standard for interchange and delivery of captions, SMPTE-TT. Accordingly, we urge the Commission to reconsider its decision in the *Report and Order* and require apparatuses to synchronize the rendering of captions with associated video according to encoded timing information with sufficient accuracy to ensure that any apparatus-induced delays are imperceptible.

I. Synchronization problems can result from the improper implementation of caption rendering and video playback features.

MEVSA and CEA insist that apparatuses play no role in problems with captions that are not properly synchronized with video. Both primarily assert that any synchronization problems with captions must result from the improper encoding of captions or unavoidable issues such as delays from captioning live video programming.[4]

We agree with MEVSA and CEA that captions that are not properly synchronized prior to reaching the apparatus responsible for rendering them are a serious problem. This is why we have repeatedly urged the Commission to adopt quality standards that require captions to be properly synchronized at the time of encoding.[5] We also applaud the Commission's decision in the *Report and*

[4] *MEVSA Opposition* at 3; *CEA Opposition* at 18.
[5] *E.g.*, *TDI, et al. Petition for Rulemaking*, MB Docket No. RM-11065, at 39 (July 23, 2004).

Order to require video programming distributors ("VPDs") to maintain the encoded timing and synchronization of captions on IP-delivered programming.[6]

But these problems are plainly not the subject of our petition for reconsideration. As we made clear in the petition, synchronization problems that occur during the encoding and delivery of video are entirely separate and unrelated to synchronization problems that may occur as an apparatus renders captions along with the video.[7] We fully agree with CEA and MEVSA that apparatus manufacturers should not be expected to correct synchronization errors that are introduced at the encoding or distribution stages, and clarify here that we did not intend to suggest as much in our petition.[8]

Rather, we are concerned that captions properly synchronized during the encoding stage and maintained during the delivery stages will become unsynchronized entirely as a result of an apparatus not rendering the captions at the correct time relative to their encoding with the video. As MEVSA admits, video post-processing and other apparatus functions can be responsible for "induc[ing] . . . a delay."[9] CEA similarly concedes that such functions "are associated . . . with delays."[10]

Of course, MEVSA and CEA contend that delays introduced at the apparatus level are likely to be "very short," "very minor," or not "noticeable."[11] MEVSA further argues that "[t]here is no reason for caption decoders to intentionally delay display of captions"; CEA similarly contends that "there

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[6] *Report and Order*, 27 FCC Rcd. at 812-13 ¶ 37.
[7] *Consumer Groups Petition* at 18-19.
[8] *See MEVSA Opposition* at 3; *CEA Opposition* at 21.
[9] *MEVSA Opposition* at 2.
[10] *CEA Opposition* at 18.
[11] *MEVSA Opposition* at 2; *CEA Opposition* at 18.

would be no reason for receivers to delay caption display, as it would consume memory for no purpose."[12]

We do not suggest that an apparatus would ever *intentionally* delay the display of captions. But displaying captions with video at the correct time relative to the captions' encoding is not a trivial or self-evident task, and an improper implementation can result in an apparatus *unintentionally* delaying the display of captions.

As CEA member Research In Motion ("RIM") noted in its comments in this proceeding that "[i]n general, rendering closed captioned text in synchrony with multimedia content is a very resource-intensive scenario" that requires significant processing "to synchronize the rendering and refreshing of caption text with the timing of the video content file being played."[13] While ensuring that captions are properly synchronized with video is not an overly burdensome or difficult task, sloppy implementations of video playback and caption rendering that do not deliberately and carefully ensure that video playback and caption rendering are synchronized may needlessly introduce timing errors. These errors may result in programming with properly encoded and delivered captions becoming entirely inaccessible to viewers who are deaf or hard of hearing.

There is strong precedent for the Commission's imposition of captioning synchronization requirements in the television context. In the original *Report and Order* implementing the television closed captioning rules, the Commission "[found] it unacceptable that existing captions might fail to be transmitted in a complete and intact manner to consumers."[14] The Commission specifically

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[12] *CEA Opposition* at 20.
[13] *RIM Ex Parte Notice*, MB Docket No. 11-154, at 3-4 (Oct. 6, 2011)
[14] *Closed Captioning and Video Description of Video Programming*, MM Docket No. 95-176, 13 FCC Rcd. 3272, 3368, ¶ 211 (Aug. 22, 1997).

pointed out that problems with "captions not synchronized with the video portion of the program . . . deny accessibility to persons with hearing disabilities" and adopted rule 79.1(c) to "to ensure that captioned programming is always delivered to viewers complete and intact."[15] We encourage the Commission to follow this precedent and require that apparatus manufacturers ensure that video playback and caption rendering are synchronized according to encoded timing information with sufficient accuracy to ensure that any apparatus-induced delays are imperceptible.

II. Mainstream captioning standards support synchronizing video playback and caption rendering.

MEVSA and CEA also assert that captioning standards, including CEA-608, CEA-708, and the Society of Motion Picture and Television Engineers' ("SMPTE") Timed Text Format ("SMPTE-TT") do not provide the necessary timing data to enforce a synchronization standard.[16] Accordingly, CEA insists that it would be impossible for apparatus manufacturers to comply with any synchronization standard.[17] But these contentions are wholly undermined by MEVSA's and CEA's own explanations of the standards—as well as the standards themselves.

With respect to CEA-608, MEVSA and CEA both acknowledge that individual bytes of caption data are associated with each field, or frame, of video.[18] As CEA points out, that means that the captions are "correlated to the video being displayed."[19] In other words, there is implicit timing information

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[15] *Id.* at 3368-69, ¶ 211.
[16] *MEVSA Opposition* at 3-4; *CEA Opposition* at 19-20.
[17] *CEA Opposition* at 19.
[18] *MEVSA Opposition* at 3; *CEA Opposition* at 19.
[19] *CEA Opposition* at 19.

included in the association of caption data with a frame of video because the action required by any individual caption data associated with a frame must be taken with respect to that particular frame, and not some other frame. Thus, there is an exact correspondence between each frame of video and the captions that must be displayed during that frame of video. As RIM's explanation makes clear, video playback software must take specific steps to ensure that individual caption data is processed and rendered along with the frames of video that it arrives with, and not earlier or later.

With respect to CEA-708, MEVSA and CEA both explain that captions are carried in digital signals at 9600 bits per second.[20] But just as with CEA-608, caption data does not arrive at random times unrelated to the propagation of the video stream. Rather, a packet of caption data arrives precisely with the frame of video that the original video author encoded it with. The chunks of caption data within the packet each correspond with specific subsequent frames. As new packets arrive, the chunks of data within again correspond with specific frames. As with CEA-608, video playback software must take specific steps to ensure that individual packets of caption data are processed and rendered along with the frames of video that they are specifically associated with, and not earlier or later.

With respect to SMPTE-TT, MEVSA and CEA both acknowledge that the Commission adopted the format as a safe harbor interchange and delivery format.[21] In recommending SMPTE-TT, the Video Programming Accessibility Advisory Council ("VPAAC") concluded that SMPTE-TT best met the technical capabilities required for captioning IP-delivered video programming, including the requirement that "[c]losed-captioning data must be carried through the

[20] *MEVSA Opposition* at 3; *CEA Opposition* at 20, n.61.
[21] *MEVSA Opposition* at 4; *CEA Opposition* at 20 & n.63.

content distribution chain intact (e.g., in a lossless manner) and with no change in timing relative to video."[22] And when evaluating whether IP-delivered captions are compliant with the requirement that they be of at least the same quality as television, the Commission will "consider such factors as . . . timing."[23] Against this backdrop, the dubious nature of MEVSA's and CEA's claims that SMPTE-TT does not facilitate synchronizing video playback and caption rendering should become immediately obvious.[24]

Indeed, contrary to MEVSA's and CEA's claims, SMPTE-TT does support precise timing of captions. As the SMPTE document describing the recommended practice for converting CEA-608 caption data to SMPTE-TT format details, SMPTE-TT files contain explicit time codes for the display of captions.[25] This SMPTE-provided example of SMPTE-TT captions illustrates the obvious nature of the time codes:[26]

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<p region='pop1' style='basic' xml:space='preserve'
        begin='00:00:03:04' end='00:00:06:08'><span tts:backgroundColor='black'
tts:color='white' >Hey, everyone,<br/>I have great news!</span></p>
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In this example, the caption

> Hey, everyone,
> I have great news!

must be displayed from three seconds and four frames into the video until six seconds and eight frames into the video. If the caption is not displayed during

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[22] *First Report of the Video Programming Accessibility Advisory Committee*, at 22, 26 (July 12, 2011) ("*VPAAC Report*").
[23] *Report and Order*, 27 FCC Rcd. at 812, ¶ 37.
[24] *See MEVSA Opposition* at 4; *CEA Opposition* at 20.
[25] *See SMPTE Recommended Practice: Conversion from CEA-608 Data to SMPTE-TT*, at 16 (Jan. 3, 2012), https://www.smpte.org/sites/default/files/rp2052-10-2012.pdf ("*SMPTE Recommended Practice*").
[26] *Id.* at 19.

that period, it will not be properly synchronized with the associated frames of video.

MEVSA and CEA nevertheless insist that SMPTE-TT files include only two methods for signaling captioning timing that are ineffective to facilitate synchronization: (1) absolute timing—i.e., a specific day and time—and (2) relative timing between captions, including the duration a caption should be displayed and the length of time between captions.[27] This explanation is incomplete, and at least in part, flatly wrong.

SMPTE-TT is an SMPTE-specific "profile," or superset, of the World Wide Web Consortium's ("W3C") Timed Text Markup Language ("TTML") standard.[28] TTML defines two "time base" modes—"media" and "smpte"—that specifically facilitate associating particular caption data with a particular video frame, and thus enable apparatuses to precisely synchronize captions with video.[29] These TTML time codes are accurate to at least the second, and optionally to the millisecond, frame, or even fraction of a frame.[30]

As MEVSA and CEA suggest, TTML also includes a third absolute "clock" mode that is not suitable for synchronizing captions, or for captioning functionality in general.[31] But neither MEVSA nor CEA attempt to explain, nor can they, why captioned video would ever be delivered using the "clock" mode

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[27] *MEVSA Opposition* at 4; *CEA Opposition* at 20 & n.63; *Report and Order*, 27 FCC Rcd. at 860, ¶ 124.
[28] *See SMPTE Standard: Timed Text Format (SMPTE-TT)*, at 3 (Dec. 3, 2010), https://beta.smpte.org/sites/default/files/st2052-1-2010.pdf.
[29] *See W3C TTML 1.0* § 6.2.11 (Nov. 18, 2010), http://www.w3.org/TR/ttaf1-dfxp/#parameter-attribute-timeBase.
[30] *Id.* § 10.3.1, http://www.w3.org/TR/ttaf1-dfxp/#timing-value-timeExpression.
[31] *See id.*

instead of the more appropriate "media" or "smpte" modes. For example, SMPTE specifically recommends that CEA-608 captions be converted into SMPTE-TT captions using the synchronization-compatible "media" mode.[32]

In short, our understanding of mainstream captioning specifications makes clear that MEVSA's and CEA's claims about the specifications' inability to support caption synchronization are wholly specious. We believe that the specifications are fully capable of supporting synchronization and urge the Commission to reject MEVSA's and CEA's suggestions to the contrary.

CONCLUSION

Because mainstream captioning specifications specifically support precise synchronization of captions and video, and because synchronization problems can arise as a result of improper implementations on apparatuses, it is incumbent on apparatus manufactures to ensure that video playback and caption rendering are sufficiently synchronized to ensure that any apparatus-induced delays are imperceptible. Accordingly, we urge the Commission to reconsider its decision in the *Report and Order* and require apparatuses to maintain synchronization of captions and video.

Respectfully submitted,

/s/

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June 18, 2012

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[32] *See SMPTE Recommended Practice* at 16.

† Counsel thanks Georgetown Law student Chris Poile for her assistance in preparing these reply comments.

CERTIFICATE OF SERVICE

I, Niko Perazich, Office Manager, Institute for Public Representation, do hereby certify that, on June 18, 2012, pursuant to the 47 C.F.R. § 1.429, a copy of the foregoing document was served by first class U.S. mail, postage prepaid, upon the opponents:

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